

though it extends well north of California. Finally, I found 3 typo's/mistakes, which makes me wonder how many went unnoticed in other chapters.

I think the most significant contributions of this book are the descriptions of unique, edaphic community types that many vegetation ecologists are unfamiliar with, the integration of plant and animal ecology, and the conservation and management considerations. Compared to typical community descriptions, there is greater discussion of subjects such as endemism, animal interactions, and the widespread management problem of how to determine and achieve an appropriate fire regime. It is interesting and worthwhile to look at these phenomena from the many different aspects and perspectives found in this book.

—DENNIS C. ODION. Marine Science Institute, University of California Santa Barbara, Santa Barbara, CA 93106.

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Terrestrial ecoregions of North America: A conservation assessment. By Taylor Ricketts, Eric Dinerstein, David Olsen, Colby Loucks et al. 1999. Island Press. Covelo, California. 485 pp.

When I first saw this book my initial feeling was that this was yet another way to classify ecosystems similar to the U.S. Forest Service ECOMAP (Bailey et al. 1994) or Omernik (1995) approach. However, as I probed the pages I found the book was indeed not only an attempt to divide up the continent into ecologically based units, but most importantly, a true analysis of biological and conservation traits using the 116 ecoregions as study units. By defining the ecoregions and having specialists in various taxonomic groups address basic conservation attributes of each ecoregion, the editors have come up with the first uniform treatment for the continent of these principal building blocks of ecological assessment.

Within the last two years this book and The Nature Conservancy's Precious Heritage (Stein et al. 2000) have arrived and addressed similar issues of national/continental scale conservation. Both are valuable additions to the literature. However, Terrestrial Ecoregions of North America is by far the more scholarly and amenable for use as an actual conservation biology tool for the North American Continent. Precious Heritage, with its glossy format and beautifully illustrated examples of the biota, is pitched to the neophyte who needs to be educated on the urgency of conservation needs and on an overall awareness of the biotic distinctiveness of the United States. Terrestrial Ecosystems is a more utilitarian (and less costly) book. The photos of animals and plants are minimal and not particularly

well reproduced. However the numerous multi-color maps of the continent are clean and effective.

One of the greatest attributes of the Terrestrial Ecosystems book is its adherence to the standardized and uniform division of ecoregions. These ecoregions were defined in a systematic way that is well described in the first chapters. The rationale for defining them anew, in lieu of adopting an existing ecoregional classification, is based on the lack of existing uniform treatments for ecoregions covering the full geographic extent of North America. However, adherence to previously defined units where possible is strong, particularly Omernick's (1995). Using the ecoregions, instead of a combination of ecological and political (states, counties) geographic criteria for judging conservation importance, as is the case in Precious Heritage, the book provides a even-handed and readily comperable method of assessing the entire area.

The standardized assessment approach involves a hierarchical division of the continent into realms (3), biogeographical zones (5), 10 major habitat types, and 116 ecoregions. Each of these is given a set of discriminators broken into biological distinctiveness criteria and conservation status criteria. The former include species richness, endemism, rare ecological or evolutionary phenomena, and rare habitat types. The latter include habitat loss, remaining habitat blocks, degree of fragmentation, degree of protection, and future threat. Derived from these criteria are: 1) a biological distinctiveness index, and 2) a conservation status index, which are integrated into five main categories ranging from "globally outstanding ecoregions requiring immediate protection" to "bioregionally and nationally important ecoregions requiring protection of representative habitat blocks and proper management elsewhere for biodiversity conservation." Richness and endemism is analyzed for representative taxa for which sufficient information exists. These include amphibians, birds, butterflies, mammals, vascular plants, reptiles, and land snails. Subdivisions of these major taxonomic groups are also treated including conifers, trees, and tiger beetles. Special features such as subterranean karst biodiversity are also discussed.

The biological assessment elucidates some very interesting facts. Though it is brought out that if politically defined, California leads all other conterminous states in species richness and endemism, the division of the general California area into 12 distinct but relatively small ecoregions has moved the individual ecoregions within or partially within the Golden State into the second tier with respect to several criteria. These include total endemism of all taxa (leaders are the southeastern conifer forests of Florida and adjacent states, and the Colorado Plateau). Bird richness and endemism are lead by southwestern US ecoregions including the Chihua-

huan and Sonoran Deserts. The southeast U.S. is leader in amphibian and snail richness and diversity. Mammal richness is also centered on the Colorado Plateau and the Chihuahuan Desert, while surprisingly mammal endemism is greatest in the Sierra Nevada and the California interior chaparral and woodlands. Many patterns reflect the general trends of tropical diversity. For example, the southwestern border ecoregions lead in butterfly and reptile diversity and endemism.

Perhaps most interesting to you may be the vascular plant patterns, which show the southeastern mixed forests lead the nation in richness with over 3100 species, while the most diverse ecoregion in California is the Mojave Desert with about 2300–2400 species. Vascular plant endemism is lead by the Colorado Plateau and the southeastern conifer forests with over 200 species, while the California ecoregions having highest endemism include the Klamath Province and the California interior chaparral and woodlands, both with between 111 and 150 species. Note this analysis is based on full species (no subspecific taxa) as determined by John Kartesz.

Turning to the conservation status of ecoregions, portions of California do rank among the most threatened including the Great Valley—deemed to have no remaining large blocks of habitat. The Great Valley, the Northern California coastal forests, and the California Coastal sage and chaparral all rank among the most critically imperiled of ecoregions in the conservation snapshot analysis. California also has the unfortunate distinction of containing the greatest number of introduced vascular plant taxa in any ecoregion in its interior chaparral and woodlands ecoregion (879 species).

In the synthesis of biological distinctiveness and conservation status California contains six ecoregions (more than any other state) that are considered globally outstanding requiring immediate protection of remaining habitat and extensive restoration. These are: Klamath-Siskiyou forests, Northern California coastal forests, Sierra Nevada forests, California interior chaparral and woodlands, California montane chaparral and woodlands (includes the Transverse and Peninsular ranges), and the California coastal sage and chaparral.

The main body of the book concludes with a list of the dozen highest-ranking ecoregions in need of immediate attention. The authors compare the relative amount of attention that the Florida Everglades has received with these additional ecoregions, and suggest that all of these are as worthy of attention as the Everglades. Three of these are in California; Coastal sage and chaparral, Klamath-Siskiyou, and Sierra Nevada forests.

Recommendations for the protection of these ecoregions are listed in a 10-point plan. These points, though inherently reasonable and rational,

will have different likelihood of success unless political climates change. For example, completing networks of last remaining habitat in a system of reserves is a easier goal to achieve than allowing fire to play its critical role in maintaining biodiversity or restricting livestock grazing in a number of ecoregions.

Although the core of the book is a conservation assessment (104 pages), the largest portion of the book is devoted to six appendices, the largest of which is a detailed account of each of the 116 ecoregions written by local experts. Other appendices detail the methods of the calculations used to arrive at the biological distinctiveness and conservation ranks, and also include specific lists of richness, endemism for each of the taxonomic groups treated by ecoregions. Appendix F is more than twice as lengthy as the main portion of the book. It contains individual summaries of each ecoregion and is written and/or edited by a group of local experts. (Robin Cox, David Olsen, Bob Holland, and John Sawyer have co-authored a number of the California ecoregions).

My criticisms of the book are relatively minor. As the book is titled a conservation assessment of North America, one would expect to see a detailed treatment that includes not only the US and Canada, but Mexico down to the isthmus of Tehuantepec. In fact although a good map of Mexican ecoregions is displayed, there is insufficient information to afford a detailed analysis of the Mexican ecoregions. Although the treatments of each ecoregion in Appendix F are valuable, they are somewhat uneven in scope and content. I was generally satisfied with those I am most familiar with. However, some inconsistencies remain. For example, some of the best treatments include detailed point-by-point descriptions of what conservation actions need to be taken (including specific locations that need protection), while other areas are not specifically addressed in this way.

As with many good hierarchical treatments, the next step becomes clear. For each of these ecoregions a similar local level assessment needs to be done. The Nature Conservancy is doing this work on an ecoregional level throughout much of California and the rest of the United States. Although the hierarchy in this book stops at the 116 ecoregions, the Bailey ecoregions (1994) do have a more complete nesting of hierarchies down to very local level a geographic scale down to the sub-watershed or so-called ecological land unit. The ecological subsection map and descriptions produced for California (Miles and Goudey 1997) has great conceptual valuable in this regard, yet similar detailed treatments have not been done for all of the country.

I recommend this book for a lucid, scientific approach to conservation at the continental scale. I

intend to take it with me whenever I travel throughout the continent, as it not only affords a clear strategy, but also is a valuable biogeographical summary of information that stands alone in its own right.

—TODD KEELER-WOLF. Senior Vegetation Ecologist, Department of Fish and Game, 1416 9th St. 12th Floor, Sacramento, CA 95814.

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